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## Postoperative Tonsil Bleeding: A Problem of the General Practitioner

*The general practitioner plays an important role in the prevention and control of post-tonsillectomy hemorrhage*

---

H. GRANT PRESTON, M.D., *Harrisonburg, Virginia*

When postoperative tonsil hemorrhage occurs after the patient leaves the hospital, it becomes an added problem in the practice of the internist or general practitioner. His guidance in the preoperative, and postoperative care plays an important part in the patients well-being and comfort.

Postoperative bleeding may become dangerous and is usually alarming to the patient's family, and disturbing to those responsible for the patient's care.

Bleeding may occur the same day of the operation and is spoken of as "immediate", or it may occur later, usually from the fifth to tenth day, and is then called "delayed" hemorrhage. Remarks will be limited to the delayed type because immediate bleeding is nearly always due to failure of the surgeon to control the bleeding at the time of operation. This latter statement is true even when the loss of blood is associated with some blood dyscrasia.

When tonsils and adenoids are removed, a rather large denuded area remains. Serous fluid bathes this area and with infection, which is normally present in the throat, a coagulated membrane is formed. Capillary loops grow from below into this grayish coagulum which is tightly adherent. Healing takes place by granulation and epithelialization beneath the membrane of exudate until about the seventh to tenth day when it begins to slough off. If healing has progressed satisfactorily and no capillaries are torn by its forceful removal, bleeding is not likely to occur. If, however, from the usual motion of swallowing or because of delayed healing or excessive infection, the dislodgement of the membrane is premature, delayed capillary bleeding might result. Again, due to infection or faulty clot formation, the thrombotic plug in a vessel's end may be dislodged and bleeding result.

#### REVIEW OF LITERATURE

Fox<sup>1</sup> has listed the following predisposing and direct causes of delayed bleeding: (1) Acute febrile diseases during convalescence; (2) dietary deficiencies, especially in vitamins such as C and K, and in proteins; (3) local infection; (4) trauma, and (5) blood dyscrasias and certain drugs, such as aspirin. To these causes we may add hypertension with arteriosclerosis, premenstrual congestion, general toxemias such as that associated with rheumatic fever, and others.

It is generally conceded by most of the larger clinics that the incidence of delayed postoperative tonsil hemorrhage is from 5 to 10%. It is interesting to find that numerous observers have reduced their inci-

dence of bleeding in many different ways.

Fox<sup>1</sup> reports a reduction from 9.9% to 1.3% by the elimination of chewing gum containing aspirin. He believes that the local action of the drug on the tonsil fossa is responsible for much of the bleeding.

Neivert & Pirk<sup>2</sup> reduced their delayed bleeding from 10% to 1.4% by using vitamin K with any aspirin taken. They attribute their reduction to the return of the prothrombic time to normal by vitamin K, after its prolongation by aspirin.

Fishman & Lebo<sup>3</sup> reported 341 cases of tonsillectomy followed by only 0.5% delayed bleeding. Their patients used aspirin freely without medication to prevent bleeding. They concluded that the use of the Beck-Schenk type of snare reduced operative trauma and thus, late bleeding.

McGovern<sup>4</sup> attributes a reduction in the incidence of bleeding in 150 cases of tonsillectomy to the control of infection by the use of chewing gum—containing sulfathiazol.

Preston<sup>5</sup> reported a series of 3,311 tonsillectomies in which bleeding was reduced from 5.2% to 1.85%. He concluded that the use of vitamin K for 10 days postoperatively, the minimum use of aspirin, and the reduction of trauma were responsible.

#### POST-TONSILLECTOMY HEMORRHAGE

The general practitioner plays an important role in the prevention and control of post-tonsillectomy hemorrhage. He should insist on complete recovery from acute upper respiratory diseases with an interval of

1. Fox, Samuel L., *Archives of the American Laryngological, Rhinological & Otological Society*, 160, 1952.

2. Neivert & Pirk, *Arch. Otolaryngology* 43:566, 1946.

3. Fishman & Lebo, *Bull. Prac. Ophth., Greens Es Hosp.* 17:1, 1947.

4. McGovern, *Arch. Otolaryngology* 40: 196, 1944.

5. Preston, H. Grant, *Transactions of the American Laryngological, Rhinological & Otological Society*, 1946.

three or four weeks between recovery and the operation. In the case of rheumatic fever the sedimentation rate should remain normal before elective surgery is performed, as these cases are especially prone to hemorrhage. The large amounts of salicylates taken may play a part in this predisposition.

The physician usually knows if a predisposition toward bleeding exists in the patient or his family. In such cases complete blood studies should be done to eliminate dyscrasias such as leukemia and hemophilia. In many cases, secondary anemia occurs preoperatively and should be treated with appropriate blood-building agents and the blood picture should be made to return to normal, if possible, before tonsillectomy. Sensitivities to certain antibiotics is likely to be known of by the family physician and the surgeon should be warned against their use. It is often wise for the family physician to give some appropriate antibiotic for a few days prior to entering the hospital. A careful and complete physical examination is usually the internist's obligation before tonsillectomy is undertaken. A diet heavy in proteins, such as meat, eggs, milk, cheese, and gelatin should be encouraged for several weeks before operation. Sufficient supplements of vitamins, especially C should be prescribed where indicated. In regions where calcium deficiencies are common, calcium may be added. Vitamin K should be given one or two days before surgery. Hypertension should be recognized and the indications for tonsillectomy be weighed against the seriousness of the elevation of blood pressure and any arteriosclerosis present.

At the time of operation, care should be taken to prevent as much trauma to the pillars and other pharyngeal muscles, as possible. All

bleeding should be controlled before the patient leaves the operating table, whether by the use of pressure, sutures, ties, or crushing of the vessel's mouth. The removal of the adenoids should be done first, thus leaving strong, intact tonsil pillars; this procedure has proven most successful in minimizing the pillar trauma. The use of the Beck-Schenk or similar instrument is attended by less trauma than the conventional dissection and snare method. The patients head should be elevated so that any bleeding in nasal pharynx may be observed and completely controlled.

#### TREATMENT AT HOME

On returning to his home the patient must again rely heavily upon the attention of the family physician. Rest in bed, usually for 2 or 3 days, may be sufficient but vigorous exercise should not be allowed for 10 days. The taking of fluids should be insisted upon from the beginning, and dehydration should not be allowed to develop, even if parenteral fluids must be given. Soft solids such as custards, cereals, gelatin and ice cream, should be encouraged after the first day. This type of food should be increased to general diet without harsh or rough foods, as rapidly as possible. Vitamin C should be given to supplement that need in the diet. A mild laxative such as milk of magnesia, followed by an enema, if necessary, should be given on the second night after the operation. A daily bowel movement without straining should be assured.

Penicillin is given intramuscularly while the patient is asleep and again on leaving the hospital. If more or other antibiotics are necessary, the family physician should prescribe them. The author uses a tablet containing sulfadiazine and sugar. The salicylamide promises to relieve



pain and not enhance bleeding. Aspirin should not be used without vitamin K and then only sparingly.

Chewing gum containing aspirin should not be allowed. Codeine and phenacetine are good drugs to use where pain is severe. Gargles should not be used, as they tend to dislodge the membrane prematurely and enhance bleeding.

We have found that printed instructions, given to the patient when leaving the hospital, are helpful. A 10-day supply of vitamin K is prescribed to be taken after meals and at bed time.

If in spite of these measures, bleeding occurs, the patient should try such simple measures as gently gargling with one part of hydrogen peroxide to three parts of water, the use of an ice collar and the eating of crushed ice. Children should be made to lie on their abdomen with the head to the side to avoid swallowing blood. When much blood is swallowed, nausea with pallor, sweating, rapid pulse, and subsequent vomiting of large quantities of bloody gastric contents follows. This is alarming to the patient and the family and may be the first evidence of bleeding. These signs, especially repeated swallowing, even without vomiting demands careful examination of the throat for bleeding. If these simple procedures fail to control the bleeding, the family physician should be called or the patient should return to the surgeon who performed the operation.

Sedation should be given in sufficient quantities to relieve apprehension and produce sleep or good relaxation. Codeine or Morphia in one of its forms should be given in sufficient doses and are better than the barbiturates. Added doses of vitamin K may be given hypodermically.

It may be necessary to remove the clot from the tonsil fossa or adenoid space. Vasoconstriction by the application of adrenalin may be used. Coagulents such as liquid thrombin or gelform held in place may stop the oozing. Styptics such as 5% tannic acid solution, silver nitrate in strengths from 10 to 50%, monsel's solution, etc., may staunch the bleeding. Injections of novocaine and adrenalin solution about the bleeding point serves the dual purpose of stopping bleeding and anesthetizing the area for suturing if this is necessary. In suturing, a small atraumatic catgut suture can be used with little or no pain without injecting the anesthesia. Packs in the postnasal space may be necessary to control adenoid bleeding and this is a very uncomfortable procedure.

Blood cell counts should be made and transfusion of whole blood given if indicated. This procedure should not be delayed until the patient is exsanguinated. We have not found it necessary to resort to such measures as ligation of the external carotid, but one should be prepared to do so, if necessary.



## New Observations and Treatment for Vaginal Cervical Leucorrhea

*Previously effective vaginal medications are becoming less and less efficient*

---

KARL JOHN KARNAKY, B.A., M.D., Houston, Texas

Immunologically, *Trichomonas vaginalis*, *Monilia albicans* and non-specific infections have become or are becoming "chemical-fast" to medications previously used. It has been known that protozoans, fungi and bacteria become tolerant to chemicals used in the treatment of vaginal infections in 4 to 5 years. Most older drugs used in the vagina are becoming less and less efficient. This is one of the reasons that so many patients are not relieved of their vaginal infections today by vaginal medications which previously were effective. There is a constant struggle of microorganisms against medicinals being used to destroy them. Most of these microorganisms win over the medications within a few years.

### THE NEED FOR BUFFERS IN VAGINAL MEDICATIONS

It has been shown in the author's

From the author's own Obstetrical and Gynecological Leucorrhea Research Clinic, in the Medical Arts Building, Houston, Texas.

research clinic that normal vaginal and cervical secretions are about the most highly buffered secretions of the body. Further, it has been observed that if one adds a non-buffered pH 3.0 vaginal preparation to a *Trichomonas vaginalis* leucorrhea with a pH of 6.0, the resulting pH is approximately pH 6.0, rather than the desired pH 3.0. The pH of a vaginal and cervical medication means nothing if it is not buffered because the buffered action of vaginal secretions immediately neutralized the acidity of the non-buffered medication. In many of the older vaginal and cervical medications the buffering factor is not used. In several previous vaginal and cervical preparations reported or worked up in the author's clinic the importance of buffering factors were not known so were not placed in these medications.

With this "new vaginal and cervical tablet and powder" the buffering action has been controlled as deter-

mined by a Beckman electrical pH machine and an "electronic pH" machine in more than 300 vaginal infections. The correct amount of buffer needed can be best determined by testing the buffering action directly in the vagina after applying the medication and then recording the resulting pH immediately afterwards and for various intervals from 24 to 48 hours.

It has also been found that when vaginal and cervical medication with incorrect amounts of "spreading agents" are used in the vagina, there are large areas of the vaginal epithelium which are never reached by the medication, especially those areas between the folds, because there is a "moist layer" that covers the entire vaginal epithelium and across the tops of the folds of the vagina. The vaginal epithelium when not dilated, is folded similar to an accordian.

#### "MOIST-LAYER" FOCUS FOR RE-INFECTION OR RECURRENCE OF INFECTION

*Trichomonas vaginalis*, *Monilia albicans* and non-specific microorganisms stay in this "moist-layer" until the treatment period is over and then invade the vagina and cause a recurrence of the same infection. This may be one of the most common causes of resistant or recurring infections. The correct amounts of spreading agents not only remove this "moist-layer" but also act as efficient fungicides, trichomonacides and bactericides.

Potassium lauryl sulfate, potassium aluminum sulfate and sodium lauryl sulfate are efficient spreading agents. These chemicals were added in correct amounts to the "new buffered, acidic, spreading agents, sugared vaginal and cervical tablets and powder" and the correct amounts were found by observing

their action in the vagina in more than 300 vaginal infections. This new tablet has been correctly tested by being used in more than 3,000 charity patients and more than 500 private patients to prove its efficiency. It is the best medication used by the author for the treatment of vaginal and cervical infections.

#### ADVANTAGES

Among its advantages is the fact that it restores the 4 hypo's originated by the author:

1. Hypoacidity
2. Hypoglycogen
3. Hypoepithelial cells height
4. Hypo-Doderlein bacilli flora

Other advantages of this new powder and tablet are: 1 They are non-chemical fast to vaginal and cervical microorganisms; 2 Correctly buffered; 3 Corrected as to acidity; 4 Contain correct amounts of spreading agents, sugars, glucose, lactose, fungicides, and Trichomonacides; 5 Tested (with controls) in more than 3,000 charity patients and 500 private patients.

By the addition of these improvements, vaginal epithelial cell growth is stimulated; and a normal vaginal flora of microorganisms is restored which aids in the destruction of pathogenic microorganisms.

The two sugars, glucose and lactose, that are added help to restore the glycogen in the vaginal epithelial cells. These two sugars are broken down in the vagina by normal as well as abnormal microorganisms into racemic, lactic or other vaginal acids, and these sugars replace the hypo-glycogen content which is soon followed by a normal acidity, normal epithelial cell height and normal vaginal flora.

Each tablet or each 1 dram of this new powder contains:

Lactose (U. S. P.)	..... 430 mg.
Potassium aluminum sulfate	14 mg.
Phenyl mercuric acetate	.. 3 mg.
Papain	..... 20 mg.
5-7, Diodohydroxyquinoline	100 mg.
Sodium lauryl sulfate	
(U. S. P.)	..... 3 mg.
Dextrose anhydrous	
(U. S. P.)	..... 430 mg.

#### HOW TO USE THE NEW VAGINAL AND CERVICAL POWDER AND TABLETS

*At Offices* one half to 1 ounce of this new powdered medication is blown through an opened speculum into the vagina, and 4 to 6 of the tablets are inserted. A large cotton ball is placed at the introitus in order to keep the tablets in the vagina. If there is an associated vulvo-vaginitis the introital pack is not necessary, but a perineal pad is worn in order to allow the disintegrating tablets to spread over the perineum destroying *Monilia albicans* and other microorganisms.

*During Menstruation.* Trichomonads and other vaginal and cervical pathogens grow profusely during menstruation. Menstrual fluid is highly alkaline and very highly buffered, so it is important to treat the vagina and cervix during the first menstrual flow after the diagnosis has been made. The patient may douche with the new buffered, acidic, spreading agents douche powder followed by insertion of 4 to 6 of these new buffered, acidic, spreading agents tablets, three to four times a day. If the patient does not like to insert tablets during menstruation, she douches with a special buffered, acidic, spreading agents douche solution three to six times a day during the entire menstrual flow. Treating the vagina during the first menstrual flow that occurs after the diagnosis is made improves

the results. The author has never seen Trichomonads undergoing cell division except during menstruation or in acute vaginitis cases where serum was present, and the author has personally examined more than 10,000 positive smears in the past 20 years. If infection is severe the nurse prepares the menstruating patient before the physician comes into the treatment room. One to 2 ounces of this powder is blown into the vagina through an opened speculum; 10 to 15 tablets (the number required to fill the vagina) are inserted deep in the vagina followed by a cotton plug at the introitus. Usually only one treatment of powder is necessary. After that only tablets are used by the patients. *Trichomonas vaginalis*, *Monilia albicans* and other vaginal pathogens are destroyed *immediately*, and the pH (acidity) of the vagina drops immediately to approximately 3.0 and remains at a normal low pH for 18 to 24 hours. The patient inserts 4 to 8 of these tablets at bedtime nightly, followed by the introital plug. Treatment should be thoroughly carried out during the first menstrual flow. It is this one course of treatment during the menstrual flow that makes more certain that all pathogenic microorganisms are destroyed in the vagina.

*At Home:* One to 2 tablets are inserted into the vagina twice a day or 2 to 4 tablets inserted at bedtime, with a cotton plug at the introitus. A perineal pad may be worn. Enough cotton is placed at the introitus to keep the melted tablets from seeping onto the perineum. Cotton has been shown to stimulate the vaginal epithelium, while gauze irritates it. If the patient desires coitus during the treatment period, she is to douche with this solution before and after the act, and then insert the 4 tablets followed by an

introital plug. The male is to use a fish skin or condom at this and all coital for contacts 3 to 9 months. This is very important for more complete and better results since the male is the carrier of most *Trichomonas* infections.

*During Next 3 Months:* The patient is to douche with this "new buffered, acidic, spreading agents douche" twice a day and 3 to 6 or as many times a day as possible during the menstrual flow.

#### SUPPLEMENTS TO THE TREATMENT OF VAGINAL AND CERVICAL INFECTIONS

*During the Next 30 to 60 Days:* 0.0125 milligram micronized stilbestrol, 1 to 2 tablets at bedtime. This is very essential. The vaginal epithelium is aided in its return to a normal adult state. It also aids in correcting the 4 hypo's; a normal amount of glycogen; the epithelium height, the normal acidity; and normal bacterial flora.

*Fish Skin or Condom at Coitus.* Fish skin or condom is worn at coitus for 3 to 9 months. In this time if the sexual partner is not reinfected *Trichomonads* and other microorganisms die out. The semen is a very important agent in reinfection. The vagina improves in these cases with just one vaginal treatment of 1 ounce of this "new powder" and the 6 "new vaginal" tablets which are left in the vagina for 24 hours, and the sexual partner uses fish skin at coitus for 3 to 6 months. The author has proven by the electronic pH machine that the vagina becomes more normal in acidity if the husband uses fish skin or condom at coitus and no vaginal medications are used. Semen and/or coitus appears to keep the vagina less normal in pH. The author has not found or used any medication that helps destroy *Trichomonads* in the male.

*Diet.* A well balanced diet including non-cooked green-leaf and other vegetables, fruits, no fats and an abundance of lean meats, milk and eggs should be taken. Plenty of fresh air and exercise. Green-leaf vegetables contain plenty of folic acid and raw cabbage contains plenty of Vitamin C.

*New Special Vitamin and Mineral Tablet:* These tablets were worked up in the author's research clinic. One to two tablets are given daily for 30 to 60 days. This aids in restoring the vaginal epithelium to normal by activating the preestrogens into active estrogens which act upon the vaginal epithelium. A complete vitamin tablet should have plenty of B Complex plus vitamin C and trace elements. A complete B Complex plus vitamin C plus trace elements tablet causes growth of vaginal epithelium. Any similar vitamin tablet with the same trace elements may be used. B. Complex does not work without vitamin C and neither B Complex nor C works without trace elements.

*New Special Buffered, Acidic, Spreading Agent Douche:* After 7 to 14 days of using the "new powder and tablets" treatment and before the first occurring menstrual flow the patient is to douche twice a day and four to six or as many times as possible during the menstrual flow in order to prevent recurrences.

*Test For Results:* No treatment is given for 1 month and immediately after the fourth menstrual flow ends, a fresh smear is made, patient coming to the office before douching. The results of the smear gives the results of the treatment. In over 500 patients the results with this new treatment were most gratifying.

*To Prevent Reinfections in The Vagina:* If the patient is told to douche when itching or burning recurs like she had previously, with

the "new correctly buffered, acidic, spreading agent" douche 3 to 6 times a day, lying down when she douches, using 2 to 4 teaspoonsfuls to a quart of tap water. She is to douche for 3 to 4 days. In this way the infection is destroyed before it becomes established in the vagina. This technique has prevented more than 300 private patients from returning for a second course of Trichomonal treatment. The author has a rule that, if Trichomonas ever recurs after the above outlined treatment, all further vaginal treatment is free, so the author has been able to make a more complete follow up.

**Cervical Lesions:** Cauterize, coagulate, or cone as may be needed. During the treatment period microorganisms stay up in cervical lesions. After treatment they swim back and reinfect the vagina. This is another very common cause of reinfection or recurrences of Trichomonas vaginalis, Monilia albicans and non-specific infections of the vagina.

**No Antibiotics Are to be Used in the Vagina or on The Cervix.** Use of antibiotics vaginally may sensitize

the patient to that antibiotic, and if she happens to need that drug, then she may not be able to use it. No more allergic reactions have been observed since the use of this new powder and tablet. No more fungi (Monilia albicans) have been seen growing in the vagina or perineum or anus due to antibiotics.

This new powder and tablets, are also used *before* and *after* cauterization, coagulation and conization of the cervix; also *before* and *after* cystocoele, rectocoele and all vaginal operations; also to control the *foul odors* associated with cancer of the labia, vagina, cervix and uterus, also very useful for post partum vaginitis and cervicitis. It can also be used to *prevent, stop* or *control* recently acquired Trichomonal, Monilia and non-specific infections of the vagina. It also stops itching and burning of the vagina, vulva and perineum. In dysfunctional uterine bleeding, its use with tight vaginal cotton packs prevents odors and infections.

---

The new buffered, acidic, spreading agents, sugared, fungicidal, bactericidal tablet and powder is known as Baculin. The douche is known as Amfrecin. The vitamin is Cevron.

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## Cause of Essential Hypertension

The theory expounded is that under normal conditions the blood pressure is maintained by the antagonism of 1-noradrenaline and thyroid extract. In essential hypertension there is excessive sympathetic activity, which is not balanced by thyroid activity.

In support of the theory, experimental evidence of the interaction

of nor-adrenaline and thyroid extract is produced. The author has applied his theory by treating a series of cases of hypertension with thyroid extract. In 70 per cent of 334 cases the blood pressure was significantly lowered and symptoms relieved. Failure is attributed to the existence of a renal factor.

---

P. Menof, *South African Med. J.*, 27: 418, 1953.

## NOVO ZINC INSULIN

Recent trials have largely confirmed the claims of the Danish Novo Terapeutisk Laboratories that their new insulin represents an advanced on all previous insulins. Hallas-Møller and associates (*Science*, 116: 394, 1952) made the rather simple discovery that the addition of small quantities of zinc to dissolved crystalline insulin in acetate buffer precipitated the insulin over a wide range of pH, including that of the body fluids. This fact had previously been obscured because phosphate is sometimes used as a buffer for insulin, and added zinc is precipitated as zinc phosphate rather than combined with insulin. Zinc insulin crystals form when zinc chloride is added to dissolved crystalline insulin, buffered with acetate to a pH of between 4.5 and 5.8, whereas outside this pH range the precipitate is amorphous. The fact that the zinc insulin crystals, once formed, are stable over a wide range of pH is of great practical importance. The duration of the effect of these insulins depends largely on the size of the particles in the precipitate. Thus, zinc insulin crystals 100  $\mu$  long exert a hypoglycemic action for more than 30 hours in man, whereas the finer amorphous zinc insulin particles act for some 12 to 14 hours. The Danish manufacturers have also made up an intermediate variety containing both crystalline and amorphous forms of zinc insulin, and this lasts about 24 hours. Each variety contains nothing but thrice crystallized insulin combined with zinc (2 mg. per 1000 units) and suspended in saline and acetate buffer to bring the pH to 7.2.

It is claimed that 90 per cent of all diabetics needing insulin can be successfully treated with a single

daily injection of an appropriate zinc insulin preparation; the insulin requirements of the other 10 per cent show such wide and spontaneous fluctuations that no one-injection regime would be satisfactory. A similar claim has been made for NPH insulin, which has a duration of action that suits most diabetics.

There is, however, the important factor of the individual response to a given diet and insulin dose, and this response is surprisingly variable. If the action of NPH insulin proves to be too long delayed, the time can easily be shortened by mixing in a proportion of soluble insulin. But if the action of NPH is too short, nothing can be done to lengthen it; and here lies one of the main advantages of the new series of zinc insulins which can be graded to cover a wide range of action. Another advantage is their purity and freedom from added protein, which makes local skin sensitization unlikely. In fact no cases of skin sensitivity to these insulins have so far been reported, in spite of their use in patients known to be sensitive to other insulins. The simplicity of the ingredients of the Novo zinc insulins means that uniformity of action from batch to batch is more likely, and preliminary studies by Oakley (*Proc. Roy. Soc. Med.*, in press) suggest that this is so. It would at present only complicate matters to add the three grades of Novo zinc insulin to the three types of insulin already in this country, but few would claim that the present insulins are ideal. It seems reasonable, therefore, to give a wider trial to Novo zinc insulins, under carefully controlled conditions, to provide adequate data on which to decide whether they can replace globin and protamine zinc insulin altogether.

Annotations, *Lancet*, 1987-1988, 1953.



# Poliomyelitis

*An outline of the treatment  
of the three stages of this  
most publicized of diseases*

STANLEY WOLF, M.D., Washington, D. C.

Probably no other disease strikes more fear in a home than poliomyelitis. Parents wait anxiously for the physician to complete his examination, and are relieved when they are told it is not polio, even though the true diagnosis may carry a far graver prognosis.

Poliomyelitis may be divided into three distinct stages:<sup>1</sup>

1. *Acute Stage or Stage of Acute Febrile Illness.* This may be divided into preparalytic and paralytic phases.

2. *Convalescent Stage or Stage of Recovery.* This stage lasts approximately 16 months after the acute stage. It is the period during which muscles may regain their power. Two phases are differentiated here: a sensitive phase-pain and muscle spasm and the insensitive phase.

3. *Chronic or Residual Stage.* No further muscle recovery is to be expected, although the functional capacities of the patient may be great-

ly improved by sound orthopedic management.

## ACUTE STAGE

The incubation period is thought to last about 7 to 20 days with the median incubation period close to 12 days.<sup>2</sup> The onset of symptoms typically follows a diphasic pattern. Initially, the patient experiences such non-specific symptoms as malaise, low grade fever, sore throat, headache, etc., lasting about three days. Usually, unless a member of the family already has clinical poliomyelitis, the diagnosis of upper respiratory infection is made. If no further symptoms occur, the true diagnosis will never be known, yet the patient is going to develop immunity to the disease. After a few asymptomatic days a small number of patients will again develop the same symptoms and now show signs of meningeal irritation and a higher fever. A spinal tap will be positive in about 90% of these cases. These symptoms may last only three to

1. Green, W. T., *New England J. Med.*, 238:73, 1948.

2. Sartwell, P. E., *American Journal of Public Health*, 1952.



four days and disappear completely without residual damage (abortive polio) or more often, will last about seven to ten days. The patient is in the acute febrile stage, until his temperature has been normal for at least 48 hours. He should be considered contagious until this time and certainly be kept in bed. As long as a patient is febrile, no prognosis as to eventual outcome should be given.

#### TREATMENT IN THE ACUTE STAGE

*Preparalytic Phase.* Poliomyelitis should be considered in the differential diagnosis of any febrile illness, especially during the polio season. Any patient with an undiagnosed disease, which might be the first phase of the diphasic type of onset, should be placed on limited activity or, preferably, bed rest for a sufficient period until the temperature has returned to normal and the possibility of this disease is eliminated.

The diagnosis of poliomyelitis is made from the signs and symptoms of the disease and is confirmed by results of the examination of the spinal fluid. The presence of a negative spinal tap does not rule out the presence of this illness.

*Paralytic Phase.* Absolute bed rest is very important. The use of hot packs is at present the most satisfactory method of alleviating the pain and muscle spasm which are predominant symptoms. These packs should be applied often enough to modify the symptoms, but not so often nor for so long as to further dehydrate a patient already dehydrated by fever, anorexia, and climatic conditions. Patients receiving hot packs for any length of time should be given salt by mouth (Thermotabs) one to three times daily.

Careful attention to position of parts, especially in the presence of spasm, weakness or paralysis is necessary. The patient should be kept in anatomic position with special supports beneath his knees and ankles and against the soles of the feet if possible.

The use of drugs to relieve the pain and spasm is the subject of much debate. Aspirin can usually be given and occasionally codeine can be administered, if there is no danger of respiratory center depression. From time to time reports on the use of a certain preparation as a cure, or for dramatic relief of symptoms appear in the literature, only to be later contradicted. All claims as to the efficacy of a drug should be cautiously considered. The variability of the individual cases, differences in severity of epidemics, possible differences in the behavior of the three distinct immunologic strains of virus, and variations in methods of appraising the condition of a patient are variables and must be considered before a drug can receive unqualified approval.

Since a definite lowering of skin temperature and plethysmographic changes indicating decreased blood flow have been noted in areas affected with muscle spasm, vasodilating drugs were tried. Priscoline has been extensively tried and, in general, has been discarded as unsatisfactory.<sup>3,4</sup> Hexamethonium, or Bistrinum, was also tried with no appreciable relief of symptoms.<sup>5</sup>

In an attempt to block nerve impulses to muscles in spasm, curare was used. This had a rather short duration of action and was found to be of questionable value and quite dangerous. Longer acting curare preparations likewise have not generally proven satisfactory.<sup>6</sup>

3. Reilly, W., Barsanti, A. *J. Pediat.*, 36:711, 1950.

4. Geisler, W. O., et al. *Canad. M. A. J.*, 63:60, 1950.

5. Wolf, S., et al. *Clin. Proc. Child. Hosp.*, 1952.

6. Wolf, S., *Med. Annals D.C.*, 21:415, 1952.

In an attempt to augment the nerve impulses to diseased muscles, prostigmine has been tried, with poor results.

Aureomycin, having proved its value in some virus diseases, was employed extensively in poliomyelitis without effect.<sup>7</sup> Darvisul, a promising sulfonamide derivative, also gave poor results.<sup>8</sup>

ACTH and cortisone have not only been found useless in the relief of symptoms,<sup>9, 10</sup> but there is experimental evidence to show that ACTH may render the host slightly more susceptible to paralysis.<sup>11, 12</sup>

Blood plasma was used, after it was demonstrated that there was frequently a drop in the albumin fraction of blood protein in acute poliomyelitis. Results are equivocal, but some investigators have been encouraged by the results in their small series.<sup>13, 14</sup>

Convalescent serum has been discarded as of no value, despite early favorable reports.<sup>15</sup>

Gamma globulin was of no value in the active treatment of the disease.<sup>16</sup>

Many other drugs have been tried with similar poor results. At the present time, hot packs remain the treatment of choice for relief of muscle spasm.

In the acute phase of the disease, certain complications must be handled properly to prevent death of the patient. Spinal respiratory muscle involvement is an indication for the use of a respirator. The pa-

tient should be placed in a respirator as soon as this weakness manifests itself, rather than be made to wait until use of the apparatus is absolutely necessary, thereby further tiring already weakened muscles. The tank respirator, or iron lung, is the respirator of choice in these cases. Patients in the tank respirator must be watched for evidence of anoxia, atelectasis, pulmonary edema or pneumonia, and venous thrombosis. The patient should be moved frequently. Since abdominal pain may indicate nephrolithiasis or appendicitis, it is imperative that the patient has at least one bowel movement daily and that his urine be checked periodically.

Bulbar poliomyelitis is the most serious form of the disease, especially if the lower cranial nerves, the vital respiratory, or vasomotor centers are involved. Involvement of the soft palate, tongue, pharynx or larynx may be present with changes in voice, swallowing difficulty, or regurgitation through the nose. Treatment, of course, depends upon the symptoms. Good nursing care is essential. The patient should be in Trendelenburg position for postural drainage, and suction of the pharynx may be frequently necessary. Suction should never be through the nose because this will ultimately increase secretions due to mechanical irritation. If there is no evidence of swallowing difficulty, the patient may be fed with caution. However, at the first sign of dysphagia he should receive nothing by mouth and be given parenteral fluids. The amount of sodium in these solutions should be carefully watched in order to prevent overadministration and edema. Protein, in the form of blood plasma or hydrolysate, should be given daily, as part of the parenteral feedings.

Respiratory center involvement should be suspected when the pa-

7. Appelbaum, E., Saigh, R., *J.A.M.A.*, 143:538, 1950.
8. Firpi, M. A., et al, *Clin. Proc. Child. Hosp.*, 5:239, 1949.
9. Rhoads, P. S., *Arch. Int. Med.*, 87:1, 1951.
10. Coriell, L., et al, *J.A.M.A.*, 142:1279, 1950.
11. Ainslie, J. D., et al, *J. Lab. & Clin. Med.*, 38:344, 1951.
12. Foster, C., et al, *Ibid.*, 38:359, 1951.
13. Chudnoff, J. S., *California Med.*, 73:401, 1950.
14. Bower, A. G., et al, *Am. J. M. Sc.*, 220:46, 1950.
15. Vogel, E., *New England J. Med.*, 242:899, 1950.
16. Bahlke, A. M., Perkins, J. E., *J.A.M.A.*, 129:1146, 1945.

tient has irregular, shallow respirations. Frequently a conscious effort to breathe may be necessary. Sedation in this stage may eliminate this conscious breathing effort, and the patient will die. Therefore, any sedation during the acute stage of poliomyelitis, when the disease may possibly spread over more areas of the body, and certainly in patients with respiratory difficulty, is strongly contraindicated. Cutaneous sensory and drug stimulation of the respiratory center may occasionally be done, although these methods are not satisfactory for long intervals. Caffeine in doses of 10 milligrams per kilogram has been used for this purpose. Cases in which the respiratory center, while still functioning, is sending very irregular, inadequate impulses to the respiratory muscles, the electrophrenic respirator is of definite value. Because of the marked irregularities of respiration, use of the tank or other similar respirators will cause aspiration of secretions and pulmonary edema, and hence their use is contraindicated.

The principal clinical features of circulatory center involvements are irregular, shallow, rapid pulse, a rising blood pressure with decrease in pulse pressure, a florid dusky-red color, and cherry-red lips. Hyperpyrexia is common. The patient is usually alert, but restless and confused. Treatment is unsatisfactory, although neosynephrine in doses of 0.1 milligram per kilogram given subcutaneously has been tried.

Symptoms of encephalitis are exceedingly common in poliomyelitis. They generally appear as apprehension, irritability, restlessness, twitching of facial muscles, and tremors. Insomnia may be marked. The patient may be confused and even comatose. Commonly, encephalitic signs are not due to the virus

but to hypoxia and will often disappear after oxygenation takes place. In the pure encephalitic type, sedative drugs may occasionally be used.

In all cases of poliomyelitis, anoxia must be prevented since this may cause further damage to already damaged anterior horn cells and brain tissue. Therefore, any obstruction to respiration should be removed and oxygen should be administered, usually by nasal catheter. If an adequate airway cannot be maintained, tracheotomy should be performed.<sup>17</sup> It should be emphasized that the fluid and electrolyte balance of these patients must be watched. Prevention of the respiratory acidosis from accumulation of carbon dioxide is important. Correction of dehydration without causing overhydration and pulmonary edema, and correction of anemia if present will greatly aid the patient. Fluids, especially glucose solution, when given subcutaneously or intramuscularly, aggravate the muscle tightness and soreness which are part of the disease.

Antibiotics are definitely indicated in the following patients:<sup>18</sup>

1. Respiratory difficulty with danger of pneumonia.
2. Catheterization with danger of secondary infection.
3. An appreciably elevated leukocyte count, suggesting a secondary bacterial infection.

Urinary retention is a not uncommon complication of paralytic poliomyelitis. Repeated catheterization, or the use of an indwelling catheter, tends to prolong the period of urinary retention and should be avoided if possible. In these cases, furmethide (1.5 to 5 milligrams per dose) may frequently be used with good results in non-allergic patients to stimulate the bladder.<sup>19</sup> Furme-

17. Kelleher, W. H., *Lancet*, 71:973, 1951.

18. Stimson, P. M., *J. Pediat.* 39:144, 1951.

19. Lawson, R. B., *South M. J.*, 41:251, 1948.

thide may be given subcutaneously or sublingually. It may increase oropharyngeal secretions and therefore should never be given to patients with respiratory paralysis or bulbar involvement. The most important aspects of therapy in the acute phase are rest and good nursing care.

#### TREATMENT OF THE CONVALESCENT STAGE

When the patient's temperature returns to normal there is no abrupt change in therapy, however, more active measures are gradually undertaken to restore muscle function. Since muscles are still sensitive in this early convalescent stage, gentle handling, rest, and the use of hot packs are still indicated. Gentle exercise involving passive motion and later active motion is done several times daily to carry the body part out of deformed position and gradually increase the range of motion. The anatomic position should be maintained if possible. A muscle evaluation by a trained physical therapist or orthopedic surgeon should be done at this time and repeated periodically, to evaluate the patient's progress and serve as a guide for active exercises. The care of the poliomyelitis patient in the convalescent stage and later in the chronic stage is primarily a physiotherapeutic and orthopedic problem. The objects<sup>20</sup> of this orthopedic care may be listed briefly as follows:

1. Prevention of deformity.
2. Protection of paralyzed muscles from overstretching and fatigue.
3. Maintenance of circulation in the affected parts.
4. Improvement of function by early movement of the joints and muscle training.

#### EPIDEMIOLOGY

The virus of poliomyelitis is spread via fecal contamination<sup>21</sup> and/or droplet infection.<sup>22</sup> The large number of unrecognized human carriers is an obstacle to the control of this disease, but it still is sound practice to have moderate isolation of the suspected and recognized cases and their familial or other intimate associates in an attempt to decrease the opportunities for infecting others.

During an epidemic, Sabin<sup>21</sup> lists four steps that should be taken to decrease the risk of acquiring the infection:

1. Keep fingers out of mouth and wash hands before eating.
2. Keep flies away from all food and thoroughly wash that which is eaten uncooked.
3. Keep children under 16 out of crowded public wading and swimming pools.
4. Avoid intimate association (shaking hands, kissing, use of common eating utensils and towels, etc.) with members of a family in which a case of poliomyelitis has occurred within 3 weeks, even though the patient has been removed to a hospital.

Whether this last recommendation is too radical will not be definitely known until more epidemiology information is available. However, at the present time there is ample evidence to suggest the practicality of these measures. In discussing the epidemiology, the question of home care versus hospital treatment arises. "Hospitalization of the manifest case to control spread is futile."<sup>22</sup> By the time a case is suspected or recognized, the rest of the family and many other intimate contacts are already excreting polio-

20. Abbott, L. C., *J. Pediat.*, 39:663, 1951.

21. Sabin, A. B., *Ibid.*, 39:519, 1951.

22. Landauer, K. S., *Lancet*, 71:360, 1951.

myelitis virus, most of them having silent infection. Therein also lies the futility of quarantine.

Should schools or camps be closed during epidemics? It is agreed that exposure should be minimized as much as possible. However, after the first case of poliomyelitis occurs in a school or camp, the others have probably already been exposed and closure is unnecessary. If an exposed child is brought home from camp, the exertion of traveling may contribute to the onset or severity of symptoms and, if this child were a carrier, he might spread the disease at home.

Tonsillectomy should certainly be deferred until after the poliomyelitis season. The incidence of bulbar poliomyelitis has definitely been shown to be higher following tonsillectomy, and it is thought that this operation may facilitate the spread of the virus to the brain stem.

It is probably best during the poliomyelitis season to defer any unnecessary injections after the first year of life. This is because an increased incidence of paralysis of the inoculated limb following prophylactic immunization has been reported. However, below the age of one year, and certainly below the age of six months, poliomyelitis in recognizable form is relatively infrequent, and reports are now appearing urging early immunization prior to the sixth month of life.<sup>23, 24</sup> Since whooping cough is a much greater hazard during infancy than poliomyelitis, and since any immunity inherited from the mother will have been exhausted by the sixth month, this is probably sound advice.

A great deal of research is being done at the present time concerning

prophylactic immunization in poliomyelitis. This immunization naturally falls into two categories: active and passive. The recent demonstration of viremia in the preparalytic period makes it clear that low levels of serum antibody, whether derived from passive or active immunization, should theoretically be effective in prevention of paralysis.<sup>26</sup> Passive immunization has been extensively tried in the form of adult human serum and gamma globulin. The reason for this use is that most adult sera have antipoliomyelitis neutralizing power, and it was hoped that giving this to children might have a prophylactic effect.

#### GAMMA GLOBULIN

During the summers of 1951 and 1952 extensive controlled field tests were done to test the efficacy of gamma globulin in prophylaxis. 54,772 children between the ages of 1 and 11 years were inoculated, one half of them with gamma globulin and one half with a solution of gelatin. Analysis of these patients showed that significant protection was conferred beginning in the 2nd week and generally lasting thru the fifth week following the gamma globulin injection.<sup>27</sup>

Although the use of gamma globulin appears encouraging and certainly warrants further trial, the shortage and expense of gamma globulin and the probable necessity for repeated injections at four to six intervals, to assure protection during the entire poliomyelitis season, would seem to make passive immunization much less desirable than active immunization.

#### VACCINES

Active immunization in the form

23. Bousfield, G., *Lancet*, 71:1028, 1951.

24. Editorial, *Minnesota Med.*, 34:888, 1951.

25. Greenberg, M., Abramson, H., *New York J. Med.*, 52:2624, 1952.

26. Bodian, D., *Am. J. Pub. Health*, Nov. 1952.

27. Hammon, W. M., et al, *J. A. M. A.*, 150:757-760, 1952.

of a vaccine may soon be realized. Any suitable vaccine must contain the three distinct virus strains since no cross immunity exists between them. These three strains are now being cultured in tissue extracts and formalin inactivated trivalent vaccines have been prepared. These vaccines have produced demonstrable antibody formation in both children and monkeys.<sup>28</sup>

Many problems still exist, however, before large scale active im-

munization is possible. Attenuation of the virus causes it to lose much of its antigenic properties. Vaccination with unattenuated virus is not sensible or justified by the relatively low incidence of poliomyelitis. And how can we be sure the virus is attenuated? Even if these problems are overcome and a vaccine is available, it may be years before the vaccine is completely evaluated since very large numbers of children in both vaccinated and control groups will be necessary.

28. Howe, H. A., *Am. J. Hyg.*, 56:265-286, 1952.

### Treatment of Ulcerative Colitis

The most effective treatment of this condition was found to be a diet low in foods producing carbon dioxide, since the intestinal tract of these patients is usually sensitive to this gas. Roughage in the diet, except in acute illness, is less harmful than a bland diet rich in the sugars and starches which produce CO<sub>2</sub>. Antibiotics, cortisone and ACTH have recently proved useful in treating ulcerative colitis, but in some patients they permit increased growth of the fermentative higher yeasts and molds that produce CO<sub>2</sub> from the lower carbohydrate foods that ordinarily are not gas-forming. Intermittent short periods of antibiotics may be better than prolonged treatment.

Case histories of four patients are included. One patient received ACTH during her second hospitalization; ensuing improvement lasted only a few days after treatment was

discontinued. At her third admission cortisone was given and improvement again occurred. Following discharge, cortisone was continued for about 8 months; then, because of recurrence of symptoms, sulfasuxidine was substituted during a fourth hospitalization. After about 5 months on gradually reduced dosage of sulfasuxidine, the patient became worse and retreatment with cortisone was ineffective. Both drugs were discontinued and the patient was put on the diet planned to prevent formation of carbon dioxide gas. Chloromycetin was given for 4 days. After 10 days the stool was free from blood; four months later proctoscopic examination showed normal mucosa and the barium enema showed the healed stage of ulcerative colitis.

M. B. Levin, B. A. Gwynn, *Am. J. Digest. Diseases*, 20: 29, 1953.



## TREATMENT OF INFECTIONS OF THE URINARY TRACT

If a female complains of burning and frequent urination, examine urine—if negative think first of chronic urethritis; if she complains of urgency, consider trigonitis or cysts of the vesical neck; if of frequency, nocturia and pain when the bladder is full, these relieved by voiding, one should call to mind interstitial cystitis.

Too often, in the presence of such symptoms, treatment is by means of numerous new chemotherapeutic and antibiotic compounds, with no benefit. Careful evaluation of subjective and objective findings in such cases would lead to proper management.

Certainly it would not be wise to submit everyone to complete urologic examination because of certain symptoms which suggest infection. Infections of the urinary tract are secondary as often as primary. The type and site of the infection must be ascertained. Proper examination must be made of a proper specimen, obtained by catheter from a female or a second-glass specimen from a male.

It should be examined grossly, then microscopically under the high dry objective, the sediment stained with Gram's stain and examined for microorganisms. Culture of the urine is not necessary to good management in the majority of instances.

Sulfonamide in any of its forms is the most nearly universal urinary antiseptic. It is cheap and it is effective against the majority of the usually encountered Gram-negative bacilli (not *Pseudomonas*) against

staphylococci and streptococci (not *Strep. faecalis*). It is given orally and a dose of 2.0 gm. daily for a week is sufficient. A course given for 5-7 days of each month for 3 or 4 months may be of great value in case of a recurring infection.

Pencillin, 300,000 to 600,000 units given daily IM, is effective, when given either alone, or in combination with the sulfonamides or streptomycin.

Mandelic acid is an old standby. When renal function is normal it can be given with few toxic reactions, and no danger. This drug holds an important place in the treatment of many bacillary infections, also in infection with the *Strep. faecalis*.

There seems to be a synergistic relationship between the sulfonamides on the one hand and either penicillin or streptomycin on the other hand; also penicillin and streptomycin seem to act synergistically.

Too frequently the value of local treatment is forgotten. Lavage of the bladder with potassium permanganate, boric acid, or acetic acid, followed by instillation of  $\frac{1}{2}$  oz. of 5% solution of mild silver protein (argyrol) gives quick relief of acute symptoms.

Chronic urethritis is most common among females. Instillation of 5% argyrol once daily for 5 or 6 days—with dilatation to size 32 or 34 F., if indicated—is most helpful. Warm sitz baths are useful adjuncts.

Chronic prostatitis rarely causes trouble to elderly men.

E. N. Cook, *Minnesota Medicine*, 36:605, 1953.



## CURRENT LITERATURE

### Errors and Failures in Gallbladder Surgery

*Surgical gallbladder disease  
is practically synonymous with  
calculous gallbladder disease*

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R. J. PATTON, M.D., F.A.C.S., Springfield, Illinois

Errors and failures in gallbladder surgery may be due to faulty diagnosis, therapy, or technical procedure. Surgical gallbladder disease is practically synonymous with calculous gallbladder disease. The commonest indication for surgery is gallbladder colic. However, there are other symptoms which mimic gallbladder disease and make a complete diagnostic study necessary. Among such symptoms may be mentioned variants of angina pectoris, esophageal hiatus hernia, cardiospasm, peptic ulcer and pylorospasm, spastic colitis or colonic spasm associated with diverticulitis, and an obstructing neoplasm. Hepatitis with or without jaundice is frequently mistaken for primary gall-

bladder disease. Failure may also arise from improper evaluation of diagnostic procedure. Non-visualization of the gallbladder may be due to inadequate preparation of the patient for this purpose. Cholecystography too soon after an acute attack may lead to an incorrect appraisal of functional capacity. Superimposed colonic gas may cast a misleading shadow; a right renal stone may be mistaken for an opaque gallstone unless pyelography or lateral cholecystograms are resorted to.

Therapeutic errors may be due to acts of commission as well as of omission. Errors of commission are mainly attributable to faulty technique. Inadequate exposure of the

cystic vessels, of the cystic duct and its junction with the hepatic duct, can lead to diverse unpleasant consequences. Double cystic arteries occur in as high as 25 per cent of the cases, and the right hepatic artery may be ligated unless one is fully aware of the variable pattern the cystic artery may assume. If small calculi are lodged in the cystic duct they must not be forced into the common duct to remain as a nidus, requiring subsequent operative removal. Furthermore, there can result serious or fatal bile peritonitis if the cystic duct is not ligated securely. Among the errors of omission it must be clear that neglected gallbladder disease may lead to the aftermath of common duct disease, stasis, dilation, cholangitis, biliary cirrhosis, jaundice and, occasionally, neoplastic changes. The risk of gallbladder surgery will be increased if certain requisites of preoperative care are omitted. Diabetes, which is frequently present in biliary tract disease, must be controlled. Hypoprotrombinemia associated with obstructive jaundice can be corrected by parenteral injection of vitamin

K. Dehydration and electrolyte imbalance must be corrected. Finally, the cholecystectomy will not be a success if the cystic duct is clamped and ligated without adequate visualization, or if the biliary and associated systems are explored for stones or debris with less than utmost thoroughness. Failure to recognize the common duct pathology and to correlate it with the clinical history is the main cause of recurring symptoms.

Finally, even with the most complete and expert surgical care it still happens that the postoperative cholangiogram, before withdrawal of the T-tube, may reveal calculi or fragments remaining in the duct. Most of these were overlooked in some manner, but many of them came down from the inaccessible intrahepatic ducts which may actually be the site of origin. Modification of Pribam's method of dissolving these calculi by ether injections into the T-tube may afford a means of avoiding further operative intervention.

*Illinois Med. J.* 103: 295, 1953.

### Premenstrual Syndrome Treatment

Some 40% of women suffer a variety of distressing symptoms during the final week or so of the menstrual cycle. In occasional cases, similar symptoms occur at monthly intervals at other points of the cycle. They are probably produced by water-retention, and the evidence suggests that this in its turn is due to abnormal elevation of the oestradiol/progesterone ratio. Treatment with a progestogen is almost invariably successful. In mild cases relief is usually obtained by the oral ad-

ministration of ethisterone, 25 mg. twice daily, during the second half of the menstrual cycle. A larger proportion of patients can be relieved by the IM injection of progesterone, 25 mg. on alternate days, during the same phase of the cycle. Such cases are more effectively treated, with less trouble for the patient, by the implantation of progesterone, which remains effective for many months.<sup>1</sup>

R. Greene, K. Dalton, *British Medical Jour.*, 5:1007, 1953.

# Radioactive Iodine in the Treatment of Hyperthyroidism

*Report of 384 cases of primary and secondary hyperthyroidism treated with radioactive iodine*

DWIGHT E. CLARK, M.D., Chicago, Illinois

This report is based on the management of 384 cases of primary or secondary hyperthyroidism treated with radioactive iodine. These cases were followed for from 6 to 60 months and therapy has been completed in all.

The following criteria were formulated as indications for therapy:

- 1) uncomplicated hyperthyroidism in the older age group (over 40 years of age);
- 2) recurrent or persistent hyperthyroidism after thyroidectomy;
- 3) hyperthyroidism with severe cardiovascular disease or some other concurrent disease;
- 4) patients who fail to respond properly to anti-thyroid drugs;
- 5) those who refuse surgical or other therapy; and
- 6) cases with severe exophthalmos.

Co-existing hyperthyroidism and pregnancy is a contra-indication for radioactive iodine therapy. The dosage of radioactive iodine is based on the estimated weight of the gland,

the type of gland, and the age of the patient. A dose of 150 microcuries per estimated gram of thyroid tissue is given as an initial dose to patients under 40 years of age with diffuse glands, and approximately 250 microcuries to patients over 40 years of age. In patients with nodular glands, from 300 to 350 microcuries per estimated gram of thyroid tissue are given as an initial dose. None of the patients who have remained euthyroid for 4 months have developed a recurrence to date. Almost all of the patients treated are ambulatory.

In patients with diffuse glands the total dosage ranged from 1.8 to 59.6 millicuries with an average of 11.3 millicuries. The patients with nodular glands required an average of 20.5 millicuries to effect a remission with a range of 3 to 140 millicuries. Seventy-six per cent of the patients obtained a remission with one or two doses. A satisfactory remission was obtained by 327, or 85 per cent of the patients, while 53 patients, or 13.8 per cent, developed varying

degrees of hypothyroidism. Only 4 individuals had apparent permanent myxedema. All of the diffuse glands decreased markedly in size. Nodular goiters showed some tendency to become smaller. Ninety-four of the cases had varying degrees of exophthalmos. Of these, 19.1 per cent had complete regression; 58.5 per cent showed varying degrees of improvement; and in 19 per

cent the degree of exophthalmos was thought to have remained the same. No increase in exophthalmos was observed in any patient who had proptosis prior to radioactive iodine therapy. No adverse side reactions were observed. Eight cases in the series have expired; the causes of death did not seem to be related to the radioactive iodine therapy.

*Proc. Institute Med. Chicago, 19:299, 1953.*

### **The Role of Intervertebral Disc in Backache**

Only two points are made in this paper: (1) pathology in the intervertebral disc causes 75% of orthopedic backaches; and (2) the history in these cases is sufficient to make a diagnosis and to indicate treatment.

Whether the symptoms will be confined to back pain or will include sciatic pain will be determined by the location of the rupture of the annulus. If the rupture occurs posteriorly, the nucleus will bulge into the neural canal and, pressing on a nerve root, will cause pain along the course. The nerve root symptoms may subside if the protruding portion of the nucleus liquefies or if it becomes detached and migrates to a quiet area in the neural canal. Repeated protrusions may cause successive attacks. If the rupture occurs laterally or anteriorly, the nucleus escapes into an area where there are no nerve roots, and the symptoms are confined to the back. Late, however, after the disc has flattened sufficiently to narrow the intervertebral foramen, there may be pressure or irritation of the nerve root in the foramen with less well defined radiating pain.

In treatment of the initial attacks and early stages, only rest, support, physical therapy, etc. are indicated. After the course of the syndrome has been confirmed, the choices of treatment are few. However, in view of the benignity of the pathology in relation to life expectancy, the choice must be made by the patient and not be dictated by the physician.

If the patient's history of back complaint is typical, it may be accepted almost invariably as *prima facie* evidence of a disc syndrome. Confirmatory physical findings are reassuring, and x-ray evidence is helpful, but history must be the primary support of the diagnosis.

We recently surveyed a comprehensive number of patients whose spines we had fused; 40% of this group were operated upon purely upon the basis of a typical history, without confirmatory physical or x-ray evidence of pathology; 60% had confirmatory physical findings and significant x-ray evidence. The results in the group without objective findings to support the diagnosis were essentially as good as in the group with objective findings.

*Charles Rombold, Jour. Kansas Med. Soc. L1V:573.*

## Duodenal Ulcer in Children

*Clinical studies suggest that many adult duodenal ulcers originate during childhood and may be cured by careful treatment.*

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FAY K. ALEXANDER, M.D., Philadelphia, Pennsylvania

Abdominal pain in children is not an infrequent symptom. Recurrent attacks, in particular, must not be brushed off with the casual diagnosis of "interval appendix," food allergy, constipation, or mesenteric adenitis, for it would unnecessarily delay recognition of the presence of a duodenal ulcer.

The incidence of this lesion in children is difficult to estimate, but a conservative figure is 5 per cent. The most common symptom complex in children is made up of abdominal pain, nausea and vomiting, though they vary with age. In the neonatal period the findings may be climaxed by melena and perforation, with death supervening with such rapidity that diagnosis of its cause may not be recognized in time. Bleeding and pain are common at the two-year level, but beyond that age the bleeding becomes less frequent. In the older age groups, gastric upsets and abdominal pain become the most common symptoms.

The pain may be described as a generalized ache which frequently may be relieved when the child flexes its thighs on the abdomen.

Gastrointestinal disturbances of nausea and vomiting are usual accompaniments of abdominal pain. Nausea seems to be the more disturbing because of the associated loss of appetite. Weight loss and constipation may also exist. Vomiting is of the type which usually accompanies pyloric spasm; it comes to a halt as soon as the stomach is emptied.

A positive diagnosis can be readily made by careful roentgenograms. A typical niche defect will not always be seen in these cases even though the duodenal bulb may be irritated, deformed and exhibit a characteristic reaction to inflammation. Here the explanation may be found in the presence of either an active duodenitis or of multiple small shallow mucosal erosions of such magnitude as to remain invisible on the screen or films.

The choice of therapy must depend on the clinical course in each instance. Persistent bleeding, perforation, or stenosis require surgical intervention. Less urgent conditions can be treated by conservative medical measures. Many of these ulcers will moreover heal and become symptom-free if the patients cooperate and oblige with careful adherence to the necessary therapeutic measures, although this is difficult to obtain with children.

The sequence of the events observed in these cases and the clinical histories seem to give substance to the impression that many adult duodenal ulcers have their inception in childhood. It therefore is all the more urgent that an accurate diagnosis be made in children who complain of recurring abdominal pain, nausea and vomiting, for the likelihood that duodenal ulcer may be present is a real one.

*Illinois Med. J.*, 102: 285, 1952.

### Nutrition and Blood Pressure

It is well known that diet and the nutritional level may profoundly influence blood pressure and heart rate, and because of the universality of these factors, they deserve careful study.

In human subjects it has been conclusively shown that an increase in body weight elevates blood pressure, while a decrease lowers blood pressure. However, it has not been proven whether body weight per se or the dietary constituents naturally chosen by obese people (high carbohydrate and/or fat and low protein) is the direct factor which influences blood pressure.

In normotensive and hypertensive subjects most of the evidence indicates that high protein diets do not elevate or low protein diets decrease the level of the blood pressure. In normotensive and hypertensive rats, on the other hand, the blood pressure level varies directly with the level of protein intake and the evidence suggests that the synthesis of ACTH may be the link between the level of protein intake

and the blood pressure in this species.

The available evidence indicates that carbohydrate and fat influence blood pressure only in so far as they influence body weight. High fat diets combined with minimal kidney lesions produce a necrotizing arteritis in dogs, but elevation of blood pressure is not a constant finding.

High sodium chloride ingestion combined with an otherwise normal diet does not cause significant elevation of the blood pressure of normal dogs, but does elevate the blood pressure of normotensive or hypertensive rats.

Finally, in some human hypertensives, restriction of sodium intake causes marked lowering of blood pressure, while others are not affected. It seems likely, therefore, that those hypertensives who show a lowering of pressure with salt restriction, belong to a group where over-activity of the adrenal cortex is the causative factor.

C. M. Wilhelm, et al, *Am. J. Dig. Dis.*, 20: 117, 1953.

## Gamma Globulin in the Prophylaxis of Poliomyelitis

*Gamma Globulin used indiscriminately may interfere with the acquisition of mild infections which give lifelong immunity*

A. B. SABIN, M.D., Cincinnati, Ohio

Gamma globulin which is prepared from large lots of adult human serum contains antibodies against all the three known types of poliomyelitis virus. However, there is as yet little or no information on the variability in the amount of the three types of poliomyelitis antibodies in different lots of commercially prepared gamma globulin and, accordingly, different lots of gamma globulin may vary considerably.

On the basis of extensive field tests made by Hammon and associates in Utah, Texas and Iowa, the following conclusions were reached respecting the effectiveness of gamma globulin in the dosage used (i.g., an arbitrary dose of 0.14 cc. of gamma globulin per pound of body weight):

- (1) The disease was not prevented in those patients who received gamma globulin one week before the onset of first symptoms, but it may have made them milder.
- (2) Between two and five weeks after injection there was a marked preponderance of cases among

those receiving gelatin as compared to those inoculated with gamma globulin, suggesting that this dose of antibody administered either before infection or very early in the incubation period could prevent paralysis.

(3) After the fifth week there was no longer any significant difference in the incidence of the disease among those inoculated with gelatin or gamma globulin, suggesting that the dose of antibody was so small that its effect could not last more than about a month.

The final results in all three field tests (55,000 children) indicated that 31 clinically diagnosed cases of poliomyelitis, regardless of severity, occurred among those inoculated with gamma globulin, and 73 occurred among those inoculated with gelatin. If taken at their face value, this result would favor gamma globulin. However, in the author's opinion, these field trials merely warrant the conclusion that further studies on the use of gamma globu-



lin are indicated and that much more information is needed before it can be ascertained (a) whether or not it will be regularly effective in the small doses that can be used practically, and (b) if it is regularly effective, how best to use a material that is of necessity in limited supply.

But if one accepts the suggestive evidence of the field trials, there is only one rational basis for using gamma globulin and that is to administer it to those at greatest risk

in areas with a very high incidence of the paralytic disease. Protection against the mild non-paralytic forms of the infection is neither needed nor wanted. Furthermore, it should be remembered that indiscriminate widespread use of gamma globulin, particularly in effective dosage, may interfere with the acquisition of those mild or inapparent infections which give lifelong immunity.

*Ohio State Med. J.*, 49: 605, 1953.

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### **Studies on Excretion of Antibiotics in Human Saliva (Aureomycin)**

Comparative data are presented of the blood and saliva concentrations, respectively, of aureomycin at various intervals after its intravenous administration. Adult patients who had not been subjected to antibiotic therapy for at least 10 days were selected for this study. Another group of individuals made up of laboratory personnel was used as controls; they did not receive antibiotics. On the other hand, each member of the experimental group received intravenously 100 mg of aureomycin hydrochloride with sodium glycinate buffer, and each was subjected to blood serum and saliva concentration tests of aureomycin at various intervals.

The intravenous injection of the antibiotic was found to be followed by its excretion in the saliva within 15 minutes. The highest concentration of the drug in the saliva was observed at the end of the first hour after administration; by the end of the second hour there was a 40 per

cent drop in aureomycin concentration. A secondary rise in the saliva concentration of the drug, which almost equalled that attained at the end of the first hour, was observed at the end of the fourth hour. This "rebound" occurred even though the concentration in the blood serum during this interval was falling sharply. Possibly the secondary rise was merely an accidental variation within the range of experimental error, or possibly it was a true function. After the fourth hour there was a gradual drop in concentration of aureomycin. Measurable amounts were still present at the end of the sixteenth hour, but by the end of the twenty-fourth hour the drug could no longer be detected in the saliva.

These data are obviously of significance in the prophylaxis of bacteremia caused by tooth extraction.

I. B. Bender, et al, *J. Dental Research*, 32: 435, 1953.

## Treatment of Cystitis

*Minimum intake of about 3  
quarts of fluid is essential  
during presence of infection*

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K. MacLEAN, M.D., London, England

Ideally, all patients suffering from cystitis should have a straight x-ray of the urinary tract, an intravenous pyelogram, followed by cystoscopy and, if necessary, retrograde pyelography, in addition to full microscopical and bacteriological examination of the urine. If structural abnormality, hydronephrosis, stone, neoplasm or stricture is found, the indications for surgery must be considered on their merits. In these circumstances it is generally wise to withhold at least one antibiotic to which the organism is known to be sensitive for use in covering the operation.

Direct treatment of cystitis revolves about the following three principles: (1) a large fluid intake; (2) regulation of the urinary pH to counter the growth of the responsible organisms, and (3) administration of a suitable sulfonamide.

The passage of large quantities of urine through an inflamed bladder will have a beneficial effect in washing away organisms and debris, and may give great symptomatic relief.

A minimum intake of 3 liters of fluid is essential and should be continued so long as infection is present. This is especially important when sulfonamides are being given. Most infected urines are acid, so that much good may be done by rendering the urine alkaline to litmus by administering a mixture of sodium bicarbonate and potassium citrate in equal parts. In general, antibiotics and sulfonamides should be given in courses of 5 to 7 days. If the desired result is not obtained by this time, no useful purpose is ever served by continued administration. The sulfonamides, it may be noted, are still the sheet anchor in the treatment of urinary infection; they are relatively non-toxic and very effective against most of the organisms that commonly cause cystitis, such as *B. coli*. Penicillin is useful in combating streptococcal, gonococcal and certain staphylococcal infections of the urinary tract. Procaine penicillin, 300,000 units twice daily, is usually adequate. Chloramphenicol is the only effective agent against

the salmonella group. It should be given in a dose of 0.5 gm, six-hourly, and a course should never exceed one week, because of the danger of toxicity to the bone marrow. Aureomycin, terramycin and polymixin E should be reserved for those cases in which *in vitro* sensitivity testing shows them to be the antibiotic of choice.

In spite of the wide range of available antibiotics, there are two bac-

terial organisms which not infrequently remain resistant to all; they are *B. proteus* and *Ps. pyocyaneus*. With them it is necessary to fall back on the method of high-fluid intake and artificial alteration in the urinary pH which, after all, successfully combated the great majority of cases of cystitis in the pre-antibiotic era.

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*The Practitioner*, 171: 205, 1953.

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### Effect of Aminophylline on Cerebral Hemodynamics

Aminophylline apparently increases cerebrovascular resistance when given to patients with cardiac failure, with resulting decrease in cerebral blood. Cerebral blood flow was determined by means of the nitrogen oxide technique. The carbon dioxide concentration of the arterial blood usually decreased slightly after aminophylline, and either remained unchanged or increased slightly in the jugular blood. Consequently, the depression of the cerebral blood flow was not the reflection of a decreased CO<sub>2</sub> concentration in the brain, and was more likely the direct effect of aminophylline on the cerebral vessels. And although the arterio-venous oxygen differences increased as a partial compensation for the decreased blood flow, this compensation was inadequate. The cerebral oxygen consumption was therefore diminished in patients with severe cardiac failure after administration of

aminophylline; no obvious disturbance of cerebral function was noted, however.

No difference was observed in the cerebral hemodynamic response of patients in cardiac failure manifesting Cheyne-Stokes respiration, and in patients with regular respiration. The arrest of Cheyne-Stokes respiration after aminophylline could not be attributed to an increase in the cerebral blood flow. It probably was due to a stimulating effect on the respiratory center. It may be a direct of indirect effect, secondary to the depressed cerebral circulation and the resultant rise in medullary tissue carbon dioxide. This response was observed for one hour or more, thus indicating that it was not a transient effect during the phase of readjustment of the cardiovascular hemodynamics.

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J. H. Mayer, et al, *J. Clin. Invest.*, 31: 267, 1952.

## THERAPEUTIC TRENDS

### Terramycin by Subcutaneous Clysis

Children in whom oral or intravenous administration of antibiotics is contraindicated or not feasible can apparently be treated satisfactorily by subcutaneous clysis.

Thirty-six infants and children from 3 days to 4 years old received a total of 254 clyses with the intravenous form of terramycin. Most of the children received a dosage of 10 mg per Kg of body weight every 12 hours in a 1 mg per cc. concentration. This concentration was considered an adequate dose offering a "wide margin of local toleration and safety." Concentrations above 5 mg per cc. were not advised. All clyses, it is claimed, were well tolerated and no untoward reaction either local or systemic were observed.

Terramycin was found to be stable and compatible in physiological saline, dilute dextrose solution or 1/6M sodium lactate and Darrow's solution, and may be added to these solutions when they are needed for electrolyte repair.

Recommendation is made of a terramycin concentration of 1 mg per cc. with a dosage of 10 mg per Kg of body weight every 12 hours. A dosage of 20 to 25 mg every 8 to 12 hours is recommended for more serious conditions.

### Studies in The Use of Lente Insulin, A New Long-Acting Form

This new form of long-acting insulin has been developed in Denmark. It is based on the finding that very small quantities of zinc in the amount of 1 mg per 1000 units are less soluble at the pH of the blood than is protamine insulin, provided that phosphate and citrate ions are not present. By the use of an acetate buffer, rather than a phosphate buffer to adjust the pH of insulin, the presence of a very small amount of zinc results in the formation of an insoluble insulin preparation. It was also found that the form of insulin, whether amorphous or crystalline, determined the length of action of the insulin. Activity from 12 to 36 hours was reportedly possible depending upon whether the insulin was amorphous, amorphous and crystalline, or pure crystalline. Based upon these findings, three insulin preparations have been made available as "semi-lente," "lente," and "ultra-lente." These cannot be mixed with soluble insulin.

Clinical trials with the lente insulin were made on 11 hospitalized adult diabetics. All of the patients had been previously standardized on soluble insulin, protamine zinc insulin, or globin insulin. The unitage of lente insulin employed was the same as the total unitage of the

W. J. Farley, L. Konieczny, *J. Pediat.*, 42: 177, 1953.

other insulins as standardized. The fasting blood sugar levels at 8 a.m., the noon level and the 6 p.m. blood levels were essentially comparable, but by 9 p.m. the level obtained with lente insulin in most cases was considerably lower than that obtained with the other insulins.

The authors therefore conclude that it would appear from this small series of patients that lente insulin is capable of controlling the blood sugar of moderately diabetic patients throughout the day without causing hypoglycemia during the night. They found that it exerts a short hypoglycemic action comparable with and equal to that of soluble insulin. It did not produce either local or general reactions, and it appeared to be no more likely to produce hypoglycemic reactions than present insulin preparations.

R. D. Lawrence, W. Oakley, *Brit. Med. J.*, 1: 242, 1953.

### Obesity

An alternate approach to the problem of obesity may be sought through an understanding of the appetite-regulating mechanism of the body, which causes the weight level to change and then to resist change from the new level.

Assuming that homeostatic equilibrium between caloric intake and expenditure is characteristic of a normal level of body weight, treatment of obesity should be directed first toward mobilization of the adipose deposits and the achievement of this equilibrium.

The diet should merely supplement body fat in meeting the energy demands of the body, and the *ad libitum* intake of protein and fat, with only carbohydrate restricted, would seem to fulfill the qualifications of such a diet.

A. W. Pennington, *J. Clin. Nutr.*, 1: 100, 1953.

### Clinical Investigation Neohydrin

Treatment by the oral route of 33 patients with congestive heart failure by means of Neohydrin is claimed to have produced "dramatic" results in 27 of them. Compensation was maintained with a dosage of three to four tablets daily. Thirteen patients have thus far been observed and maintained successfully on this dosage for a period of from 6 to 12 months, and nineteen patients for a period of from 2 to 5 months. Complete subjective and objective relief of symptoms was obtained after two weeks of Neohydrin therapy. Two patients with rheumatic and two others with lumatic heart disease have for 4 months been completely free of all signs and symptoms of congestive failure in response to treatment with the new oral mercurial. These patients had for three years previously been treated with digitalis as well as with Mercuhydrin injections. All of the patients in this study had, moreover, been receiving Mercuhydrin injections for 1 to 5 years prior to the change to treatment by the oral route. In addition to the oral mercurial, all of these patients were maintained on digitalis, a salt-free diet, aminophyllin and ammonium chloride. Blood counts, urinalysis, chest x-rays, fluoroscopic examination, electrocardiogram and electrolyte studies were made wherever clinically indicated.

The results seem to indicate that this new oral mercurial preparation can successfully replace parenteral Mercuhydrin in effecting and maintaining a state of compensation in congestive heart failure. More time and a wider experience will be necessary before an estimation of the long-term effects of this new therapeutic approach can be made.

W. Leff, H. E. Nussbaum, *J. Med. Soc. New Jersey*, 50: 149, 1953.

## AIDS IN DIAGNOSIS

### Diagnosis of Intestinal Amebiasis

The most recent development in the diagnosis of amebiasis is described. The antigen necessary for the test was prepared from a strain of *Endamoeba histolytica* grown on an egg slant medium in the presence of an associated bacterium. Three stools taken on alternate days were tested; ten cc. of blood was drawn from the fasting patient when the first stool was submitted. The blood was centrifuged and the serum was sent to the Lilly Research Laboratory. There a complement fixation test was done according to a modification of the Bengston 100 per cent hemolysis system. (The antigen is available from Lilly Research Laboratories on request; it is not available commercially.) The results were correlated on completion of the tests.

Of the 100 cases studied, the correlation with stool examinations was 80 per cent, there being only 6 per cent false positives on the basis of 3 negative stools. Since amebae are commonly discovered only after 5 or more stools have been examined, the percentage of false positives should probably be reduced. This test is evidently worthy of more extensive clinical trial.

F. Steigmann, et al, *Gastroenterology*, 23: 70, 1953.

### Diagnosis of Posterior Myocardial Infarction

The purpose of this study was to ascertain if, and how often, localized high posterior wall infarction occurred, because preliminary vectorcardiographic studies suggested such lesions in 8.6 per cent of all patients with posterior infarction. At the same time, it was sought to answer the question whether an electrocardiogram can be of diagnostic value in these cases. Eighty cases were analyzed and studied.

Isolated high posterior wall lesions were found in 6, or 7.5 per cent of the 80 unselected cases with proved posterior wall infarction. These constituted the indirect anatomico-pathologic evidence for the high posterior infarcts diagnosed by vectorcardiography in 8.6 per cent of 104 cases with posterior wall infarction. The two infarcts limited to the upper zone, and 2 of the 4 limited to the middle zone, were not recognized by electrocardiography, indicating a very limited value of the electrocardiogram in the diagnosis of high posterior lesions.

Posterior infarction was correctly diagnosed by electrocardiography in 47, or 58.8 per cent of the 80 cases. The electrocardiographic diagnoses were: (a) posterior infarction, 33 cases; (b) anterior and posterior in-



farction, 14 cases; (c) anterior infarction, 14 cases, and (d) abnormal electrocardiogram, 19 cases. Anterior infarcts were demonstrated histologically in all but one of the cases in which this diagnosis was made ante-mortem.

Posterior infarction was not diagnosed by electrocardiogram in 39 of 86 cases with proved posterior wall lesions; the cause of the failure could be discerned in 36 cases. Old anterior infarction and left ventricular hypertrophy do not diminish the diagnostic value of the electrocardiogram in posterior infarction. However, the vectorcardiogram appears to be superior to the electrocardiogram for the diagnosis of posterior myocardial infarction.

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L. Wolff, et. al, *Am. Heart J.*, 46: 21, 1953.

### Diagnosis of Pancreatitis

Tests for the concentration of amylase and lipase in the serum are by far the most rewarding laboratory procedures for diagnosis during attacks of acute or relapsing pancreatitis. The tests are relatively simple and should be carried out on every patient examined during or after an attack of abdominal pain of unknown origin. The results of the test can be known within an hour after the blood has been drawn, which makes this test available as an emergency procedure. Serum lipase cannot thus be used because the results do not become available for 24 hours after the blood has been drawn. Following an attack, the concentration of serum amylase usually returns to normal in roughly one to four days; that of lipase may remain increased for a longer time.

Serum enzymes are not always increased in concentration even during proved attacks of pancreatitis. The explanation is perhaps that

the acinar cells of the pancreas are damaged to a degree which renders them incapable to elaborate the enzymes. On the other hand, increased concentrations of serum amylase and lipase during painful abdominal seizures are not necessarily pathognomonic of pancreatic disease, for other conditions, such as perforation of a duodenal ulcer, peritonitis from one cause or another, and intestinal obstruction, may also elicit this increase. However, such increases in the serum concentration of these enzymes as are brought about by extra-pancreatic causes do not as a rule reach the high values usually found in acute attacks of pancreatitis.

A slight increase in the concentration of serum bilirubin giving a direct reaction to the van den Bergh test is a common occurrence in episodes of abdominal pain due to pancreatitis. It is therefore wise to make both serum bilirubin and serum enzyme determinations in case of attacks of abdominal pain of unknown cause. Chronic pancreatitis with a partially obstructed common bile duct because of inflammation or of pseudocyst formation in the head of the pancreas, may result in more prolonged increases in serum bilirubin. Transient increases in blood sugar and glycosuria during attacks of abdominal pain may occasionally be the first clue to the diagnosis of pancreatitis and are worth determining by appropriate laboratory procedures. Any patient with long-standing history of recurring attacks of abdominal pain and in whom diabetes develops should be suspected of having chronic relapsing pancreatitis.

Calcifications in the pancreas, as revealed by x-rays, are diagnostic of chronic pancreatitis.

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*Sur. Gynec. & Obst.*, 96: 371, 1953.